

ROYAL BOTANIC GARDENS, KEW.

BULLETIN

OF

MISCELLANEOUS INFORMATION.

No. 4]

[1925

**XX.—CONTRIBUTIONS TOWARDS A PHYLOGENETIC
CLASSIFICATION OF FLOWERING PLANTS: V.***

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THE GENERA OF PAPAVERACEAE.

In the introduction to the first of these Contributions (*K.B.* 1923, p. 65), it is stated that ultimately it is intended to publish the full results of these studies in a separate work. As it will be some time before such a work can be completed and published, however, I have decided to add a few further features in order to make these Contributions of more immediate use to teachers and students who may not have access to a large herbarium or botanical library. The *Taxonomic References* now included refer to works in which the genera are classified, and amongst the *Selected Literature* will be found more readable papers and articles of general interest. These are such as have been noted during the progress of the work and they do not claim to represent a complete bibliography of the subjects. The *Characters occurring in relatively few genera*, which is such a useful feature of Bentham and Hooker's *Genera Plantarum*, should often provide a ready means to the determination of plants with outstanding or exceptional characteristics. It is often in these genera that the student will find the more significant phylogenetic characters which link allied families together.

In this paper I give a key to the genera and a short account of the family *Papaveraceae*.

KEY TO THE TRIBES OF PAPAVERACEAE.

Petals present; flowers solitary, very rarely racemose or subumbellate; ovules numerous:

* Continued from *Kew Bull.*, 1924, p. 134.

Sepals free from each other (except *Eomecon* in *Chelidonieae*), early caducous ; petals and stamens hypogynous :

Flowers 3-merous ; stigmas quite free from one another, opposite the cells of the ovary ...I. PLATYSTEMONEAE.

Flowers 2-merous, very rarely 3-merous ; stigmas more or less confluent, opposite or alternate with the placentas :

Capsule mostly linear, of few (often 2) carpels, dehiscing throughout its length or nearly so ; stigmas usually alternate with the placentasII. CHELIDONIEAE.

Capsule ellipsoid or globose, rarely oblong or linear, opening by apical pores or very short apical valves, carpels mostly several ; stigmas opposite the placentasIII. PAPAVEREAE.

Sepals coherent into a calyptrium (see also *Eomecon* in *Chelidonieae*) petals and stamens perigynous

.....IV. ESCHSCHOLTZIEAE.

Petals absent ; flowers paniculate, strongly proterogynous ; ovary more or less stipitate ; ovules solitary and basal or few and parietal.....V. BOCCONIEAE.

KEY TO THE GENERA.

Tribe I. PLATYSTEMONEAE.

Carpels separating from one another in fruit and becoming torulose1. **Platystemon.**

Carpels remaining united, dehiscing by their margins :

Placentas 3, in fruit remaining attached to the valves ; leaves entire, subopposite ; flowers rather small :

Stamens definite (4-12) ; carpels twisting spirally in fruit2. **Meconella.**

Stamens indefinite ; carpels not twisted in fruit

..... 3. **Hesperomecon.**

Placentas several, separating from the valves in fruit ; leaves variously pinnatifid ; flowers large.....4. **Romneya.**

Tribe II. CHELIDONIEAE.

*Ovary not divided by a septum :

Flowers scapose from a creeping rhizome :

Scapes 1-flowered ; sepals free from each other ; petals 8-12 ; juice red..... 5. **Sanguinaria.**

Scapes few-flowered ; sepals connate ; petals 4 ; juice yellow 6. **Eomecon.**

Flowers not scapose :

†Annual or biennial (rarely perennial) herbaceous plants :

‡Petals soon falling off ; stamens numerous :

§Flowers solitary or on simple pedicels :

Pedicels bracteate at the base ; flowering stem bifoliate ; floral leaves similar to the radical leaves ; seeds crested 7. **Stylophorum.**

Pedicels not bracteate :

Capsule not ribbed or nerved outside between the
placentas :

Seeds crested ; basal leaves few ; flowering stem
usually bifoliate and 1-flowered

..... 8. **Hylomecon.**

Seeds not crested ; basal leaves mostly numerous ;
flowering stem branched :

Leaves once pinnately parted

..... 9. **Dicranostigma.**

Leaves finely dissected..... 10. **Roemeria.**

Capsule with one distinct nerve between the
placentas ; leaves palmately lobed

..... 11. **Cathcartia.**

Capsule strongly ribbed between the placentas ;
stigmas connate into a hollow disk ; leaves
much dissected..... 12. **Hunnemannia.**

§§Flowers on a leafy raceme or subumbellate on a common
peduncle :

Leaves trifid only at the apex.... 13. **Arctomecon.**

Leaves pinnately divided..... 14. **Chelidonium.**

††Petals persistent until nearly the ripening of the fruit ;
stamens 6-9 ; tiny tufted plants with small flowers

..... 15. **Canbya.**

††Shrubs with serrulate leathery leaves.... 16. **Dendromecon.**

Ovary divided by a septum..... 17. **Glaucium.

Tribe III. PAPAVEREAE.

Stigmas borne on a distinct style or if subsessile then suberect
and plicate ; capsule dehiscing by short valves :

Sepals 2 ; stigmas concrete throughout, decurrent

..... 18. **Meconopsis.**

Sepals 3 ; stigmas free above, spreading.... 19. **Argemone.**

Stigmas radiating on top of ovary ; capsule opening by pores

..... 20. **Papaver.**

Tribe IV. ESCHSCHOLTZIEAE.

Only genus 21. **Eschscholtzia.**

Tribe V. BOCCONIEAE.

Stems annual ; leaves palmately nerved ; capsule membranous,
1 to several-seeded ; seeds small, with a lateral crest

..... 22. **Macleaya.**

Stems perennial ; leaves pinnately divided or nerved ; capsule
fleshy, 1-seeded ; seeds large, with a large basal aril

..... 23. **Bocconia.**

Taxonomic References.—De Candolle, *Prodr.* 1 : 117-124 (1824).
Bernhardi in *Linnaea* 8 : 401-477 (1833). Endlicher, *Gen.*
Pl. 854-8 (1836-40). Benth. and Hook. f. *Gen. Pl.* 1 :
49-56 (1862). Baill. *Hist. Pl.* 3 : 105-128 (1872). Prantl

and Kundig in Engl. and Prantl, Pflzfam. 3. ii: 130-145 (1889). Fedde in Engl. Das Pflanzenreich, 4. no. 104: pp. 1-430 (1909).

Selected Literature.—Bernhardi, l.c. (supra), "Über den Charakter und die Verwandtschaft der Papaveraceen und Fumariaceen." Payer, "Traité d'organogénie," 217-226, pl. xlv. (1857). Trecul, "Lactificères dans les Papavéracées," Compt. Rend. Ac. Paris, 60: 522 (1865). Baill. l.c. (supra). Eichler, Blütendiagr. 2: 189-199 (1878). Michalowski, "Beiträge zur Anatomie und Entwicklungsgeschichte von *Papaver somniferum*," Diss., Breslau (1888). F. Benecke, "Zur Kenntniss des Diagramms der *Papaveraceae* und *Rhoeadinae*," Engl. Bot. Jahrb. 2: 373-390, t. 3 (1882). Léger, "Appareil végétatif des *Papavéracées*," in Mém. Soc. Linn. Normandie, 18: 195-623 pl. x-xix (1894-5). C. H. Shaw, "Note on the sexual generation and the development of seed coats in certain *Papaveraceae*," Bot. Gaz. 31: 429-433, t. 15 (1904). F. Fedde, "Die geogr. Verbreitung der *Papaveraceae*," Engl. Bot. Jahrb. 36: Beibl. 81. 28-43 (1905). Prain, "A Review of the genera *Meconopsis* and *Cathcartia*," Ann. Bot. 20. 323-370. pl. 24-5 (1906). Prain, "Some additional species of *Meconopsis*," Kew Bull. 1915, 129-177 (key to spp.). For a general account and history of Opium, see Hartwich, "Die Menschlichen Genussmittel," pp. 143-220 (1911).

Characters occurring in relatively few genera or species of Papaveraceae.—Stem woody in *Dendromecon*; sometimes arborescent in *Bocconia* spp. Leaves entire in *Dendromecon*, *Platystemon*, *Meconella*, *Hesperomecon*, *Papaver* spp. *Meconopsis* spp.; floral leaves subopposite in *Platystemon*, *Meconella*, *Hesperomecon*, and *Dicranostigma*; leaves aculeate in *Argemone*. Indumentum of barbellate hairs in *Cathcartia*, and *Meconopsis* (Sect. *Polychaetia*); prickly hairs in *Papaver* spp. and *Meconopsis* spp. Flowers scapose in *Sanguinaria*, racemose in *Eomecon*, subumbellate-racemose and leaf-opposed in *Chelidonium*; paniculate in tribe *Bocconieae*. Sepals coherent into a calyptrum in *Eschscholtzia* and *Eomecon*; leathery, boat-shaped and subpersistent in *Bocconieae*. Petals subpersistent in spp. of *Platystemon*, persistent until ripening of fruit in *Canbya*; absent from tribe *Bocconieae*; perigynous in *Eschscholtzia*; 8-12 in *Sanguinaria*. Stamens subdefinite in *Meconella*, *Bocconia* spp., *Macleaya microcarpa*, perigynous in *Eschscholtzia*. Carpels distinct and torulose when mature in *Platystemon*; becoming spirally twisted in *Meconella*; valves remaining attached to placentas in tribe *Platystemoneae* (except *Romneya*). Seeds rather large and solitary in *Bocconia* and *Macleaya microcarpa*.

NOTES ON PHYLOGENY AND CLASSIFICATION.

The tribes *Chelidoneae* and *Papaveraceae* are here accorded somewhat different treatment from that given them in Fedde's elaborate monograph in the Pflanzenreich. The *Bocconieae* are now considered to be a separate tribe, whilst tribe *Eschscholtzieae* is limited to the remarkable perigynous flowered genus *Eschscholtzia* with its calyptriform calyx. The fruits of *Bocconieae*, a tribe having apetalous flowers, approach very nearly to those of *Fumariaceae*. The absence or presence of a style, a character used much for distinguishing some genera, has been shown by Prain to be of little value in the case of *Meconopsis*, wherein two very closely allied species, *M. integrifolia* and *M. pseudintegrifolia*, have, the one sessile stigmas, the other a distinct style.

As remarked in the general principles adopted for the classification of flowering plants given in the introductory notes to this work (*K.B.* 1923, p. 73), in most groups numerous stamens are, as a rule, a sign of antiquity, those genera with a small number of stamens, other things being equal, being regarded as the more lately evolved. For this there is usually a biological explanation associated with insect visitors and pollination, and with economy. In another way, however, insects may also account for an increase in the number of stamens during the course of evolution. *Papaveraceae* may be a case in point, for here "pollen flowers" occur, that is flowers provided with an abundance of stamens the pollen of which is eaten by insects, whilst there are no nectaries. The great number of stamens persisting in most of this family is therefore easily understandable, because the pollen production will be all the greater the more stamens there are, and hence the more insect visitors and greater opportunities for cross pollination. In the case of *Papaver*, the most plastic, widely spread and most successful genus of the family, we find numerous stamens associated with a special means of dehiscence of the capsule, namely by *apical pores*, coupled with the extraordinary position of the stigmas opposite the placentas, two features that can by no means be regarded as primitive. We have then, perhaps, grounds for assuming that the more primitive types of the family are to be looked for in those genera which have a small number of stamens, and which are nearest to reduced *Ranunculaceae* and *Berberidaceae*. They occur in the first tribe *Platystemoneae*, which moreover has trimerous flowers and capsules wherein the valves remain attached to the placentas after dehiscence, a normal mode of opening characteristic of the follicular *Ranales*, whence the *Papaveraceae* seem to have been derived.

GEOGRAPHICAL DISTRIBUTION OF PAPAVERACEAE.

There are at least three main areas of concentration of the family; (1) the South-Western United States, especially

California; (2) the Eastern Mediterranean and Asia Minor; and (3) Thibet and Western China. The S.W. United States shelter the whole of the tribes *Platystemoneae* and *Eschscholtzieae*, as they are here understood, and several distinct small genera of the *Chelidoniae*. The bulk of the tribe *Papavereae* is S.E. European and Asiatic, most of the Poppies occurring in the Eastern Mediterranean, whilst the genus *Meconopsis* is represented mainly in West-Central China and the Himalaya. The paucity of *Papaveraceae* in the Southern Hemisphere is remarkable, two distinct species of Poppy, one in Australia, the other in South Africa, and three spp. of *Bocconia* in N.W. South America, being the sole representatives, exclusive of weeds of cultivation. One small genus, *Stylophorum*, shows affinity between Atlantic North America (1 sp.) and N.E. Asia (2 spp.). Another, *Dicranostigma*, connects the floras of the N.W. Himalaya (*D. lactucoides*, at 10,000–12,000 ft.) and Western China (*D. Franchetianum* and *D. leptopodium*). Two most interesting allied genera, *Bocconia* and *Macleania*, occupy, the one Central and N.W. South America, the other Central and Western China. Whilst these two genera have even been regarded as one, it is probable that they have arisen quite independently of each other. Indigenous *Papaveraceae* appear to be lacking from Temperate and Eastern South America, New Zealand and the Antarctic Islands, Polynesia, Malaya and South India.

GENERA OF PAPAVERACEAE.

1. **Platystemon** Benth.—about 15 spp., very closely allied, Calif. and Oregon. Revis. by Greene, Pittonia, 5: 158–194 (1903), who recognises 52 “species”; Fedde, Monogr. Papaver. 106 (1909).
2. **Meconella** Nutt. (*Platystigma* Benth. partly, not R. Br.).—6 spp., Pacif. N. Amer. from Vancouver to San Diego, Calif., and Oregon; tiny plants a few inches high, carpels twisting spirally in fruit. Revis. by Greene, Pittonia, 5: 141–146 (1903); Fedde, Monogr. 103 (1919).
3. **Hesperomecon** Greene, Pittonia, 5: 146 (1903) (*Platystigma* Benth. partly, not of R. Br.).—about 3 spp. Calif.; type sp. *H. lineare* Fedde, Monogr. 100.—7 spp. fide Greene, 9 spp. fide Fedde.
4. **Romneya** Harv.—2 spp., Calif.; type sp. *R. Coulteri*. Fedde, Monogr. 132, fig. 19.
5. **Sanguinaria** Linn.—1 sp., *S. canadensis*, Nova Scotia to Manitoba and Nebraska, S. to Florida and Arkansas.—Britt. and Br. Fl. U.S. and Canada 2: 140. Greene, Pittonia, 5: 306–8 (1905), recognises 6 spp. Fedde, Monogr. 203, fig. 25, A–D.

6. **Eomecon** *Hance* in Journ. Bot. 22 : 346 (1884).—1 sp., *E. chionantha*, Hupeh and Kwangsi, C. China.—Fedde, Monogr. 206.
7. **Stylophorum** *Nutt.*—3 spp., Eastern Asia and Eastern U. States ; type sp. *S. diphyllum*, Eastern U. States. *S. lasiocarpum*, Hupeh. *S. sutchuenensis*, W. China.—Fedde, Monogr. 207. Britt. and Br. Fl. U.S. and Canada 2 : 140.
8. **Hylomecon** *Maxim.*—1 sp., *H. japonica*, Hupeh to Amur and Japan.—Fedde, Monogr. 209.
9. **Dicranostigma** *Hk. f. and Thoms.* Fl. Ind. 1. 255 (1855).—3 spp., type sp. *D. lactucoides*, N.W. Himal. (10,000–12,000 ft.). *D. Franchetianum*, W. China. *D. leptopodium*, Kansu-Szechuan.—Fedde, Monogr. 210.
10. **Roemeria** *Medik.*—6 spp., S. Europe to S.W. Cent. Asia ; type sp. *R. violacea*, Europe, N. Africa.
11. **Cathcartia** *Hook. f.*—1 sp., *C. villosa*, Sikkim and Chumbi (10,000–12,000 ft.) ; this is very closely allied to *Meconopsis*, especially *M. Oliveri* from Cent. China ; hairs barbellate as in *Meconopsis* sect. *Polychaetia*.—Prain in *Kew Bull.* 1915 : 33. Fedde, Monogr. 244 (excl. *Cumminsia*).
12. **Hunnemannia** *Sweet.*—1 sp., *H. fumariifolia*, highlands of Mexico, Nuevo Leon to Oaxaca.—Fedde, Monogr. 143.
13. **Arctomecon** *Torr. and Frem.*—2 spp. ; type sp. *A. californica*, Calif. *A. humilis*, Utah.—For amended descr. see A. Gray Proc. Amer. Acad. 12 : 52, pl. 2 (*A. californica*).—Fedde, Monogr. 134.
14. **Chelidonium** *Tourn.*—1 sp., *C. majus*, N. Temp. Old World ; introd. in Amer. ; var. *laciniatum*, with lobed petals.—Fedde, Monogr. 212.
15. **Canbya** *Parry ex A. Gray* in Proc. Amer. Acad. 12 : 51, pl. 1 (1876).—2 spp. ; type sp. *C. candida*, S. Calif. *C. aurea*, Eastern Oregon.—Fedde, Monogr. 386.
16. **Dendromecon** *Benth.*—6 spp. prob., Calif. ; type sp. *D. rigida*, Santa Barbara to San Diego. *D. flexilis*, Santa Cruz Isl.—Greene, Pittonia 5 : 295 (1905), recog. 17 spp. ; Fedde, Monogr. 136, 20 spp.—few of these appear to be tenable.
17. **Glaucium** *Adans.*—21 spp., Mediterr., mostly eastern part and Asia Minor ; naturalised in other parts of the world ; type sp. *G. flavum*, Europe, etc.—Fedde, Monogr. 221.
18. **Meconopsis** *Vig.*—45 spp., narrow belt N. Temp. Zone, except Japan and E.N. Amer. ; type sp. *M. cambrica*, W. Europe from Pyrenees to Ireland and Cumberland. 15 spp. in Himalaya ; 8 in Thibet ; 30 in West and Cent.

- China. *M. integrifolia*, large handsome yellow fls., Kansu to Yunnan and Cent. Thibet; nearly all Asiatic spp. occur above 10,000 ft., 2 spp., *M. heterophylla* and *M. crassifolia*, in Calif.—Prain, Ann. Bot. 20: 323–365 (1906) revision. Prain, *Kew Bull.* 1915: 129–177 (revised key).
19. **Argemone** Linn. (incl. *Enomegra* A. Nels.).—9 spp.; type sp. *A. mexicana*, widely spread in tropics and subtropics; others in dry regions from Mexico to Wyoming.—Prain, Journ. Bot. 33. 129–135, etc.; Fedde, Monogr. 271.
20. **Papaver** Linn.—100 spp., extratrop. N. Hemisphere, rare in the South; species closely allied and rather variable. *P. radiculatum*, Arctic and Subarctic regions. *P. alpinum*, high Mts. of Europe; about 14 spp. in Europe, large number in Near East (about 35 spp.), a few in N. Africa and Atlantic Isles; *P. horridum*, Australia; *P. aculeatum*, S. Afr.; *P. californicum*, Calif.; genus absent from Malaya, New Zealand, E. and S. America and Polynesia, except in cultivation.—Fedde, Monogr. 288.
21. **Eschscholtzia** Cham.—(incl. *Petromecon* Greene).—35 spp. probably, very closely allied; California, Nevada, Oregon and Washington; type sp. *E. californica*.—A. Gray in Proc. Am. Acad. 22: 2. 271–3; Greene, Bull. Calif. Acad. 66; Fedde, Monogr. Papav. 144. (Fedde follows Greene in unnecessarily multiplying the number of spp. to 123).
22. **Macleaya** R. Br.—2 spp., China; type sp. *M. cordata*, Hupeh. *M. microcarpa*, Kansu.—Fedde, Monogr. 215. Hutchinson in *Kew Bull.* 1920: 282.
23. **Bocconia** Linn.—9 spp., C. and W.S. America; type sp. *B. frutescens*, West Ind., Cent. America; 5 spp. Cent. America, Mexico to Guatemala; others in Bolivia and Colombia, one (?) in Peru.—Fedde, Monogr. 217; Hutchinson in *Kew Bull.* 1920: 275.

The following corrections should be made in previous Contributions:—

Kew Bull. 1923: pp. 82 and 86, under No. 7 for **Calthodes** read **Calathodes**; p. 89, No. 48 for “*N. laurifolia*, Burma to Philippines,” read “*N. zeylanica*, Ceylon to Himal. and East India.” *Kew Bull.* 1924 p. 128 insert the letter c in blank space in No. 111; p. 129, No. 120 for Qnünaceae read Quinaceae.

XXI.—REVISION OF THE GENUS ALPHITONIA.

K. W. BRAID.

Although the *Rhamnaceae* as a family is well-marked it possesses genera which are by no means always very sharply defined. Some of these possess species which in many instances are exceedingly difficult to differentiate with certainty as they

often appear to merge into each other in a most bewildering manner. The genus *Alphitonia* is a good example of such a case. A single representative from Borneo, New Guinea, North Queensland, New South Wales, New Caledonia and Cook Islands may give the impression that the species of the genus are admirably distinct. When, however, the collection is augmented by the addition of intermediate forms one is astonished, on making a comparison of the species, to note the many points of similarity. This consideration led Bentham in his *Flora Australiensis* to group the then known Australian species under one, *A. excelsa* Reissek, and his lead has been followed by many later authors. Subsequent additions to the collection tend to support one or other of these views. The amount of material which has been received since the publication of the *Flora Australiensis*, and the description of a number of new species, have made it desirable for some time that the Australian species should be revised. During the last few months, through the kindness of Mr. C. T. White, F.L.S. (Government Botanist, Brisbane), the Kew collection has been considerably enriched by the addition of over 40 specimens of *Alphitonia* from Australia and New Guinea; these have been supplemented by valuable notes. Mr. White's experiences with this genus have convinced him that he was dealing with more than the single species *A. excelsa*, so the material was forwarded for a critical examination and report. This has necessitated a complete revision of the whole genus.

The plants belonging to the genus *Alphitonia* are all trees or shrubs and are characterised by their alternate penninerved leaves, which are usually whitish or rusty underneath, and by their peculiar fruits. The inflorescences are arranged in many flowered di- or trichotomous cymes. The flowers themselves possess a spreading 5-lobed calyx, and the stamens are contained in the hood-shaped petals which alternate with the sepals. The ovary is immersed in the stout disk which fills the calyx tube and is 2-3-celled. The short style is 2-3-lobed, often clothed, where it meets the disk, with short hairs. The fruit is distinctive. The globular drupe possesses a thick epicarp with an endocarp of 2-3 hard, coriaceous nuts or cocci—which split longitudinally—and is surrounded at the base by the persistent tube of the calyx which forms a kind of cupule and may be regarded as a receptacle. When ripe the fruit dehisces down the ventral suture and partially down the dorsal suture; the mealy substance of the epicarp, the whole of the endocarp and portions of the receptacle fall away and leave the seeds on the remainder of the torus. The seeds are contained in a loose reddish-brown or dark-red, shining arillus* which encloses a smooth crustaceous testa. The straight embryo with the flat cotyledons lies in the cartilaginous endosperm.

* Miers, Contrib. Bot. 1. p. 245 (1851-61).

The name *Alphitonia* is based on the Greek word "alphiton"—baked barley meal—in reference to the mealy nature of the epicarp. The wood of the trees in Australia and Malaya and most of the Polynesian islands is of considerable value. It is straight in the grain, is tough and works easily. Though pale in colour when felled*, in time the heart-wood usually darkens, sometimes to rich colours of an ornamental nature. The wood is used for axe handles, palings, cabinet-making and coach-building. The bark of the Australian species possesses valuable tanning properties, and the leaves are of considerable value for fodder† during periods of drought, when the cattle appear to relish them.

Even when dealing with the same tree, considerable differences are noticeable in the sizes and shapes of the leaves, and when the leaves on the flowering branches are also taken into consideration the range of variation is very great. Usually the leaves are covered at first with a tomentum on both surfaces. This disappears comparatively rapidly and more or less completely. Its presence often masks the finer venation, so that for comparison it is desirable to have average size, mature leaves. Some authors have laid stress upon the position of the torus in the fruit as a character of systematic importance. It is evident, however, that in fruits which have been gathered before they are absolutely ripe the torus shrinks very considerably. It is often stated that the circumscissile line formed by the calyx tube around the drupe may be situated one-third or half the distance from the base.

As the leaves play such an important part in the identification of the species their texture is of great value. All species possess leaves which appear to be coriaceous, but there are great differences in the degree. It is a feature very difficult to explain in exact terms. Naturally, in part it is a character produced by habitat, and the New Caledonian *Alphitonia*s and others subject to maritime influences possess distinctly sclerophyllous types of leaves.

Two of the New Caledonian species (*A. xerocarpa* and *A. erubescens*) possess much more sclerophyllous leaves than *A. neo-caledonica*. The latter and *A. Vieillardii*, *A. zizyphoides*, *A. franguloides* and *A. ponderosa* possess more sclerophyllous leaves than do *A. excelsa*, *A. philippinensis* and *A. moluccana*. I have seen no leaf of the latter which I would consider at all sclerophyllous, but there are all grades from thin to medium coriaceous; some of the leaves are distinctly rank and coarsely grown, others are thin and very fragile. The rigidity of the leaves of many of the species from the islands makes it possible to recognise these types easily in the dried state, but the leaves of the more continental species are often dried very badly, concealing their true shapes.

* Maiden, Flor. N.S. Wales. 1. p. 38 (1902). † White, Queensl. Agr. Journ. xiii. p. 218 (1920).

. *History*.—The genus was first described by Reissek in Endlicher's *Genera Plantarum* (p. 1098). He placed in it the plant which until then had been regarded as a species of *Colubrina* (*C. excelsa* Fenzl.)* This plant had been described from specimens collected by Allan Cunningham in the vicinity of Moreton Bay, Brisbane, Queensland. Previous to this date a plant had been collected in the Society Islands and named by Solander† *Rhamnus zizyphoides*. No description, however, was given of this particular plant until Sprengel‡ published it in 1807. Wilkes§ collected similar plants again in Samoa and Fiji which later were determined by Asa Gray to be a species of *Alphitonia* (*A. zizyphoides* (Spr.) A. Gray). At the same time a species from the same region was described as new by Gray|| (*Alphitonia franguloides* A. Gray). When Bentham wrote the *Flora Australiensis* he suggested that all these species were *A. excelsa*.

Geographical Distribution.—Guppy¶ considers that there are "three or four" species of *Alphitonia* and that their geographical range is one of the chief guides to the determination of species. With this latter idea I am in agreement, and have used this factor in the treatment of the species here given.

A. excelsa was first described from specimens collected in the vicinity of Brisbane. It is common in New South Wales, and in Queensland, where it reaches into the interior as far west as Lochnagar. Mr. White points out that a closely related species, *A. Petriei*, which is very common in the rich warm forests of the coast and which springs up very quickly on deforested land after a fire, has a different habitat from *A. excelsa* which is a more inland form and lives in the Eucalyptus forest country. In the field these species are separated by their habit as well as by their habitat, but from herbarium material alone the difference is hardly apparent. *A. Petriei* only, so far as is known at present, is found along the north and north-west coast-line.

Besides *A. excelsa* and *A. Petriei* two other species occur only in Australia. Both of these are found, probably with restricted distribution, in the north of Queensland and round the Gulf of Carpentaria. *A. moluccana* found in Borneo, Celebes, Moluccas and New Guinea stretches southward into N. Queensland. *A. philippinensis* of the Philippines stretches southward into Borneo. The Hawaiian species *A. ponderosa* is practically intermediate between *A. philippinensis* and *A. zizyphoides* of Fiji and neighbouring islands. The Fijian plant, *A. franguloides*, is represented only by a small specimen at Kew. New Caledonia possesses four species all quite easily distinguished from each other. The large-leaved, robust *A. neo-*

* Fenzl., in Huegel's *Enum. plant. Novae Holland.* p. 20 (1837).

† Forster, *Flor. ins. austr. prod.* p. 90 (1786). ‡ Sprengel, *Flor. hal. Mant.* p. 37 (1807), & *Syst.* 1. p. 768 (1825). § Gray in *U.S. Explor. Exped.* i. p. 278 (1854). || Gray loc. cit. p. 280. ¶ "Observations of a Naturalist in the Pacific," p. 346.



RANGE OF ALPHONSEA.

1. *A. philippinensis*. 2. *A. moluccana*. 3. *A. Petriei*. 4. *A. obtusifolia*. 5. *A. excelsa*. 6. *A. Whitei*. 7. *A. Vieillardii*.
 8. *A. neo-caledonia*, *A. erubescens* & *A. xerocarpa*. 9. *A. franguloides*. 10. *A. zizyphoides*. 11. *A. ponderosa*.

caledonica and the smaller *A. Vieillardii*, with its shining leaves, are quite distinct from the two sclerophyllous shrubs *A. xerocarpa* and *A. erubescens*. The two latter resemble each other in many respects but specifically are distinct. Schlechter* says it is doubtful whether these two shrubby species, which are not villose, should be retained in the genus, and with this I am inclined to agree. He states that the fruit is quite different from the typical *Alphitonia* fruit. I have seen neither specimens of the fruit nor drawings of them, but from the descriptions by Baillon† I do not think that the differences are described in sufficient detail at the present time to warrant the foundation of a new genus.

Sarsaparilla and saponin.—When young shoots of *A. excelsa* are broken, or the bark peeled off, a more or less strong odour of sarsaparilla is emitted. Probably this varies with the age of the tree, its vigour, and the season of year. It certainly varies with species and is most noticeable in *A. Petriei*. Bailey notes that the leaves froth in water and are used by school children to remove stains of ink from their hands. Probably this frothing is due to the presence of saponin. Particulars are lacking as to the presence or absence of these substances in *Alphitonia* outside Australia and New Guinea, and it requires to be investigated in the cases of the other species.

In the arrangement now given *A. excelsa* Reissek (sens. ampl.) is separated into :—*A. excelsa* Reissek (sens. strict.), *A. Petriei* Braid & White, *A. obtusifolia* Braid, *A. moluccana* Teijsm. & Binn., *A. philippinensis* Braid. *A. neo-caledonica* Sch. (sens. ampl.) is separated into :—*A. neo-caledonica* (Guill.) Sch. (sens. strict.) and *A. Vieillardii* Lenorm.

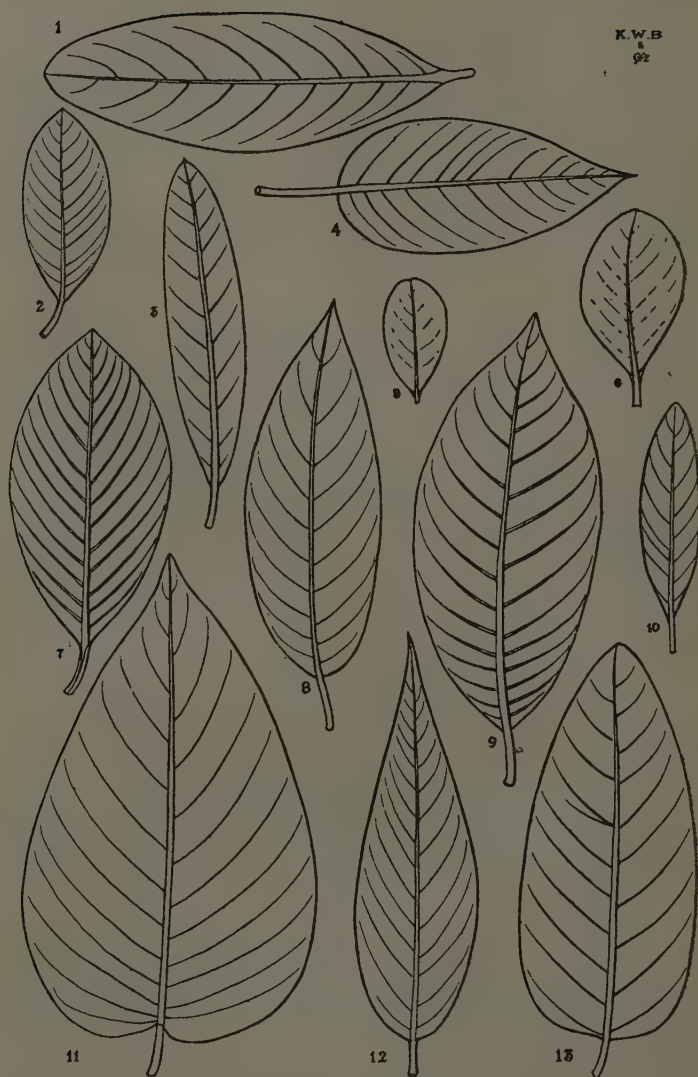
To Dr. A. B. Rendle my thanks are due for facilities to examine the specimens and Dr. Robert Brown's diary and other papers at the British Museum (Natural History), and also I wish to acknowledge my indebtedness to my colleagues Messrs. J. Hutchinson and W. B. Turrill for their assistance in placing their maturer experience in systematic problems at my disposal.

The species fall naturally into the following two sections :—

TOMENTOSAE.—Trees or large shrubs up to 60–80 feet, leaves thinly coriaceous or coriaceous, tomentose at least when young, veins distinct; calyx pubescent; disk clad with hairs only at its junction with the style.

GLABRATAE.—Shrubs or small trees up to 25 ft. in height; leaves rigidly coriaceous, glabrous, veins not conspicuous; calyx pubescent, not tomentose; disk generally glandular, tubercled, not hirsute.

* Bot. Jahrb. 39 (1906–07) p. 178. † Adansonia 11, p. 270.



LEAVES OF ALPHITONIA.

1. *A. Petriei*. 2. *A. Vieillardii*. 3. *A. excelsa*. 4. *A. zizyphoides*.
 5. *A. erubescens*. 6. *A. xerocarpa*. 7. *A. neo-caledonica*. 8. *A. ponderosa*.
 9. *A. Whitei*. 10. *A. franguloides*. 11. *A. moluccana* (broad form).
 12. *A. philippinensis*. 13. *A. obtusifolia*. All $\frac{1}{2}$ nat. size.

KEY TO SPECIES.

Section 1. TOMENTOSAE.

- A. Leaves mostly cuneate or somewhat narrowed at the base (except sometimes in young growth), more or less oblong-lanceolate ; trees or large shrubs :

Leaf apex obtuse, rarely acute (as in *A. excelsa* var. *acutifolia*), rounded or only mucronate, blade elliptical or lanceolate, base usually cuneate :

Trees or large shrubs ; venation of the leaves conspicuous but not markedly elevated on the lower surface :

Forest trees ; inflorescence hardly corymbose :

Leaves 6–11 cm. long, 1.75–4 cm. broad (on young growth approximately the same size but more oblong in shape), more or less lanceolate or oblong-lanceolate, at first tomentose and whitish beneath, later becoming glabrous, texture thin ; fruit dome-shaped, averaging not more than 1 cm. diameter. E. Australia

..... 1. **excelsa**.

Leaves 8–14 cm. long, 2.5–5 cm. broad (on young growth up to 18×10 cm. or even larger), the same shape as the preceding, but larger ; fruit depressed, averaging 1.5 cm. diameter. N. and E. Australia (coast area)..... 2. **Petriei**.

Large shrubs ; inflorescence distinctly corymbose :

Leaves 3.5–6 cm. long, 2–3.5 cm. broad, elliptical to orbicular, upper surface soon glabrous, veins soon becoming glabrous almost smooth but conspicuous, texture coriaceous, apex often emarginate. New Caledonia and Fiji..... 3. **Vieillardii**.

Trees ; leaves 4–9 cm. long, 2–6 cm. broad, elliptical, obovate or oblong-elliptical, venation elevated and prominent on the lower surface, coriaceous, apex often emarginate. New Caledonia..... 4. **neo-caledonica**.

Leaf apex distinctly acute or acuminate, blade elliptical, base usually distinctly cuneate :

Leaves rather large, 10–20 cm. long, 5–9 cm. broad (averaging 13×6 cm.), oblong-elliptical or elliptical, often asymmetric, venation and main veins on the under surface prominently raised ; petioles somewhat long, about 1.5 cm. N.E. Australia..... 5. **Whitei**.

Leaves rather small, 5–8 cm. long, 1.5–2 cm. broad, elliptical to lanceolate, apex often with mucronate cusp, venation smooth but conspicuous. Fiji

..... 6. **franguloides**.

- A. Leaves rounded or cordate at the base, usually ovate-oblong or ovate-elliptical, apex obtuse or bluntly acuminate, rarely emarginate; trees:

Leaves not acuminate, 6–14 cm. long, 3–7 cm. broad, ovate or elliptical or sometimes obovate, sometimes rather asymmetric, base rounded; petioles long, 1–3 cm. N.E. Australia.....7. **obtusifolia**.

Leaves conspicuously acuminate; petioles various:

Leaves 2–3 times longer than broad, usually rounded but hardly cordate at the base:

Leaves 6–14 cm. long, 2–5 cm. broad, distinctly ovate or lanceolate, at most only shortly acuminate, usually distinctly coriaceous, undersurface reddish, petioles often approximately 2 cm. long; inflorescence hardly corymbose. Fiji group.....8. **zizyphoides**.

Leaves elliptical or lanceolate, apex usually most distinctly acuminate, texture somewhat thin, seldom distinctly coriaceous:

Leaves 7–14 cm. long, 2–5 cm. broad, elliptical or lanceolate, apex distinctly acuminate, texture thin with whitish tomentum below, when mature with brown venation; petioles short, about 1 cm. Philippines southward to Borneo

.....9. **philippinensis**.

Leaves 8–15 cm. long, 3–3.5 cm. broad, elliptical or lanceolate, texture distinctly coriaceous, reddish brown with very conspicuous venation on the under surface; petioles long, 1.5–2 cm. Hawaii

.....10. **ponderosa**.

Leaves very variable up to 15 cm. long by 9 cm. broad in the ovate shapes, to 27 cm. long by 8 cm. broad in the lanceolate shapes, oblong-elliptical, ovate or lanceolate, apex acuminate, base rounded or decidedly cordate; texture varying from thin to somewhat thick, but never thickly or rigidly coriaceous (*i.e.*, never sclerophyllous), lower surface tomentose and white, upper not absolutely glabrous; petioles short, 1–1.5 cm. New Guinea, Moluccas, &c., Australia.....11. **moluccana**.

Section 2.—GLABRATAE.

Leaves 2–4 cm. long, 1–2 cm. broad, scarcely petioled, (1–2 mm.), obovate or oblanceolate, apex obtuse or emarginate rarely mucronate, base distinctly cuneate; blade and petiole erubescens; flowers brownish red, few; petals less than half the length of the sepals; filaments of stamens about 0.5 mm. long. New Caledonia12. **erubescens**.

Leaves 4-7 cm. long, 2-4.5 cm. broad, distinctly petioled to 1 cm. long, oblong-elliptical or oblong-orbicular, apex obtuse or emarginate, base cuneate, edges of blade often recurved; flowers many, white; petals at least half the length of the sepals; filaments of stamens about 1 mm. long. New Caledonia.

.....13. *xerocarpa*.

In the following enumeration an asterisk denotes the type specimen, or where material is incomplete the type specimens.

1. *A. excelsa* *Reissek* ex Endl. Gen. 1098 (1836-39); Bentham Flora austr. 1. 414 partim; Bailey Queensl. Flora 1. 270 (1899); Maiden For. Fl. N.S.W. i. pt. 1, 38 (1903), t. 6, and iv. pt. xl. 158 (1910), t. 5; White in Queensl. Agr. Journ. xiii. 218 (1920), t. 16; Miers Contrib. Bot. 1. pl. 33 (1851-61). *Colubrina excelsa* Fenzl. in Hueg. Enum. 20 (1837).

AUSTRALIA. Queensland: Brisbane River, *Brown, Cunningham* 81, *Dietrich, Fraser, MacArthur, V. Mueller*; Barron River, *Cowley*; Bribie Island, *Kenny*; Bunga Mts., *Moulday*; Caibeen, *Keane*; Endeavour River, *Persiech* 29; Enoggere Creek, *Bailey* 1; Fraser Islands, *Petrie* 7; Gladstone, *Hedley* 4; Goodna, *White* 6; Innisfail, *Bancroft* 22; Keppel Bay, *Brown* 5365; Lochnagar, *Johnston* 10; Marmor, *Francis*; Mawana, *MacArthur*; Mt. Lookout, *Murray* 5; Moreton Bay, *Brown, Fraser*; Percy Island, *Cunningham* 1, *Tryon* 8; Roberts Plateau, *Tryon and White*, 41; "Sub. Trop. Austr." *Mitchell* 332. New South Wales: Hunter's River, *Brown*; Port Macquarie, *Cunningham*; Sydney Woods, *MacArthur* 46.

Vernacular Names: "Coopers Wood," "Humbug," "Leatherjacket," "Red" or "White Ash," "White Leaf," "Silver-leaved Wattle," "Ane," "Coraminga" (Bellinger), "Culgera-culgera" (N.S. Wales), "Mee-a-mee" (Queensland), "Murrung" (Illawarra), "Nono Gwyinandie" (Clarence River).

This is a widely spread tree, varying in height up to 60 or 80 feet. There is considerable fluctuation noticeable in size, shape and hairiness of the leaves, and in the size of the seeds. Maiden† states that it grows on the poorest sandy soil and is of value as a fodder plant. He also records its medicinal properties and notes that it is valuable for tanning.

A. excelsa *Reissek* var. *acutifolia* *Braid* var. nov.; foliis conspicue acutis saepe mucronatis.

AUSTRALIA. Queensland: Chinchilla State Forest, *Singleton* 12; Curtis Island, *Henne*; Gilbert River, *White* 1333; (in part) Ipswich, *Hall* 9*; Robert's Plateau (Nat. Park), *White* 40; Springsure, *Richards* 11. New South Wales: Clarence River, *Brown*.

† Maiden, For. Fl. N.S.W. ii. pt. 6. 186 (1906).

It is exceptional for leaves of *A. excelsa* to be acute, although they are frequently obtuse with the mid-rib prolonged into a mucro. In some cases, however, the leaf tapers more at the apex than it does at the base. For the time being I have thought it desirable to group these acuminate forms together as a variety.

2. **Alphitonia Petriei** Braid & White sp. nov.

Arbor. *Folia* alterna, elliptica vel oblongo-lanceolata, apice acuta vel brevissime acuminata interdum emarginata cuspidata, basi cuneata, 8–14 cm. longa, 2.5–5 cm. lata (folia luxuriosa saepe multo majora) nervis leviter costa media praecipue in pagina superiore impressis, in pagina inferiore costa media vix conspicua nervis lateralibus utrinsecus circiter 9–11 distinctis; juniora omnino ferrugineo-tomentella, supra mox glabra, infra saepe albido-tomentella; costa nervisque fulvis deinde ferrugineis, deinde aliquantum glabrescentibus; petiolus circiter 1 cm. longus, tomentellus. *Inflorescentiae* terminales vel in foliorum superiorum axillis orientes, cymosae superne saepe confertae; pedunculi sulcati ferrugineo-tomentelli, rachis dichotome ramosa, ferrugineo-tomentella. *Sepala* 5, triangularia, carinata, extus albido-tomentella. *Petala* 5, spathulata, cucullata. *Discus* quinquangularis sub stylo glandulosus. *Receptaculum* (ovarium) obconicum tomentellum, 2–3-loculare, loculis uniovulatis; stylus conicus apice trilobatus (raro bilobatus). *Fructus* erectus deinde pendulus, receptaculo circiter 0.6 cm. alto inclusus, ovideo-globosus vel obovato-globosus, circiter 1.3 cm. altus, ad 1.5 cm. diametro; epicarpium siccitate farinaceum; endocarpium coccis coriaceis duris 2–3 per receptaculum longitudinaliter dehiscens. *Seminis* arillus durus, lucidus, atro-sanguineus.

AUSTRALIA. Queensland: Bellender Ker Range (foothills), *Meston Exped.* 16; Candle Mt., *White* 17; Cape York, *Darnel*; Cooroy, *White* 15; Fraser Island, *Petrie* 18; Imbil, *Weatherhead* 13; Innisfail, *Michael* 131 and 409; Johnston River, *Ladbrook* 46*; Kuranda, *White* (1525) 43*; Malanda, *White* 14; Thursday Island, *Cowley* 27, *Bauerlen* 28; Woombye, *Stuart* 19. Northern Territory, South Australia; Arnheims Land, *V. Mueller*. Western Australia; Port Darwin, *Schomburgk*.

This is a species which Mr. C. T. White says is abundant in the tropical and subtropical rain forests of coastal Queensland from Blackall Range in the south (a little north of Brisbane) to the Cairns and Atherton districts in the north. I am indebted to Mr. White for calling my attention to the existence of this species. It suggests a rank form of *A. excelsa* and though Mr. White pointed out that it smelt more strongly of sarsaparilla, flowered at a different season, produced wood of a different texture and inhabited a more coastal area, I could not find distinguishing features suitable for recognition in the Herbarium until Mr. White again came to my assistance and forwarded more specimens with detailed notes. I am now convinced that he is right, and one or two of my *dubiae* which appeared

to be intermediate between *A. excelsa* and *A. moluccana* have fallen naturally into this group. The chief distinguishing features in dried specimens are that the leaves are distinctly larger than those of *A. excelsa*, the veins are more prominent although not nearly so much so as in *A. Whitei*, and the fruit is dome-shaped not semi-spherical above and is larger (1 cm. in diam. in *A. excelsa* and about 1.5 cm. in *A. Petriei*). At Mr. White's suggestion I have much pleasure in naming the species after Mr. W. R. Petrie who first drew attention to its distinctive characters.

Mr. White gives the differences between these two species as follows :—" *A. excelsa* flowers about March, *A. Petriei* about October. The young twigs of *A. excelsa* when freshly peeled emit a faint odour of sarsaparilla but the older parts do not possess this odour; in *A. Petriei* this odour of sarsaparilla is very powerful and always noticeable on stripping the bark, even from large trunks. *A. excelsa* is a native of the open forests (Eucalyptus forest), the drier inland and coastal 'shrubs' of New South Wales and the New South Wales-Queensland border. *A. Petriei* is a native of tropical and subtropical rain forests of coastal Queensland from about 17-27° S. Like *A. excelsa* it is a very common tree and in rich open forests of the coast it often springs up thickly in areas which have been cleared of forest."

3. **A. Vieillardii** *Lenormd.*, nomen ex Guillaumin in Ann. Mus. Col. Mars. sér. 2, ix, 121 (1911).

Frutex vel *arbor* parva. *Folia* alterna, orbiculata vel ovato-oblonga vel oblonga, apice brevissime cuspidata vel saepe emarginata, 4-6 cm. longa, 1.5-2.5 cm. lata, nervis leviter costa media praecipue in pagina superiore impressis, in pagina inferiore costa media conspicua nervis lateralibus utrinque circiter 8-14 fere planis; juniora omnino ferrugineo-tomentella, supra mox glabra, lucido-viridia, infra dense albido-tomentella, costa nervisque fulvis deinde ferrugineis, deinde glabrescentibus; petiolus circiter 1 cm. longus, tomentellus. *Inflorescentiae* terminales vel in foliorum superiorum axillis orientes, cymosae, superne saepe confertae; pedunculi sulcati, 2-3 cm. longi, ferrugineo-tomentelli; rhachis dichotome ramosa, ferrugineo-tomentella. *Sepala* 5, triangularia, carinata, extus albido-tomentella. *Petala* 5, spathulata, cucullata. *Discus* glandulosus, quinquangularis. *Receptaculum* (ovarium) obconicum, albido-tomentellum, 2-3-loculare, loculis uniovulatis; stylus conicus, apice bilobatus (raro trilobatus). *Fructus* erectus deinde pendulus, receptaculo 0.6 cm. alto inclusus, ovideoglobosus vel obovato-globosus, omnino 1.2 cm. altus, usque ad 1.3 cm. diametro; epicarpium siccitate farinaceum; endocarpium coccis coriaceis duris 2-3 per receptaculum longitudinaliter dehiscens. *Seminis* arillus durus, lucidus, atro-sanguineus.

POLYNESIA. New Caledonia ; Gatope, *Deplanche, Vieillard* 2488*. Fiji ; Nandarivater, *Sir Everard im Thurn* ; Viti Levu, "*Kadoon*."

Vernacular name : "Doi" (Fiji).

This is closely allied to *A. neo-caledonica*, but when dry the exterior of the calyx is less rusty in colour and sometimes is quite whitish. Like the latter the floral axis has a great tendency to be flattened and ribbed, but it is less markedly so in the present case. The leaves vary much in shape. Sometimes they are almost orbicular, at other times oblong, the margins at the base being often markedly reflexed. The midrib is very distinct, bearing one or two prominent ridges. The veins are not very elevated as in *A. neo-caledonica*, but the reticulation of the veinlets is very conspicuous in the older leaves. The young leaves are clothed in a reddish tomentum, which later gives way to a yellowish felt-like covering, but when this latter disappears the veinlets show up distinctly as dark reddish markings. The secondary veins ramify much more irregularly between the primary veins than in the case of *A. neo-caledonica* where they are often practically parallel. This plant is almost certainly the *A. franguloides* var. *obtus*a of A. Gray, although sometimes it has been regarded as *A. excelsa*. Guillaumin quotes *Vieillard* 2488 as Lenormand's type; the specimen at Kew is a duplicate of this.

4. *A. neo-caledonica* *Guillaumin* in *Lecomte Not. Syst.* ii. 98 (1911); *Ann. Mus. Col. Marseille, Sér. ii.* x, 283 (1912) and t. 38. *Pomaderris neo-caledonica* *Schlechter* *Engl. Jahrb.* xl. Beibl. 92, 27 (1908).

NEW CALEDONIA. (*Collector not stated*) 219 (ex herb. Paris); *Cribs*; *Le Rat* 266; *Pancher* 1870; *Prony* 1594; *Vieillard* 312; *White* 2075, 2114.

Heckel in *Ann. Mus. Col. Marseille, Sér. ii.* x, p. 283 (1912), quotes *Jeanneney's* notes and says that the flowers are somewhat whitish-green in colour but in the dried state the outside looks distinctly russet-like.

Jeanneney notes the occurrence of specialised forms on the stony coasts, but says that the tree is usually 30 to 40 feet high. *R. H. Compton's* mss. notes upon specimen sheets in the British Museum state that he found this tree on river banks and stream valleys up to 200 feet above sea level. He remarks that the branches and leaves are arranged horizontally, and that the leaves are green above and reddish below when young but later become white; the peduncles and calyx are brown, while the flowers are small and greenish yellow. As his tree was only 25 feet in height it was probably either immature, or if mature was growing in the less favourable situations. These assumptions receive confirmation by the facts that in his specimens the shape of the leaves and the development of the veins are not particularly characteristic.

The peduncles are also covered with a velvety tomentum

and like the petioles distinctly grooved and often flattened. The most distinctive feature however is the prominent elevated leaf-nerves. These, as well as the midrib, are velvet-like and bear one, often two, prominent ridges. They stand prominently above the surface of the leaf usually equal in height to the thickness of the leaf, and sometimes nearly 1 mm. in height in the dried specimens. The colour of the upper surface of the leaf is said to be a brilliant green.

5. **Alphitonia Whitei** *Braid* sp. nov.

Arbor trunco ad 75 cm. diametro. *Folia* alterna, elliptica vel oblongo-elliptica, apice acuta vel brevissime acuminata, raro emarginata cuspidata, basi cuneata, 10–20 cm. longa, 3–9 cm. lata, nervis leviter costa media praecipue in pagina superiore impressis, in pagina inferiore costa media conspicua nervis lateralibus utrinsecus circiter 14–18 maxima distinctis; juniora omnino ferrugineo-tomentella, supra mox glabra, infra saepe albido-tomentella, costa nervisque fulvis deinde ferrugineis, deinde aliquantum glabrescentibus; petiolus circiter 1–1.5 cm. longus, tomentellus. *Inflorescentiae* terminales vel in foliorum superiorum axillis orientes, cymosae superne saepe confertae; pedunculi sulcati, ferrugineo-tomentelli; rhachis dichotome ramosa, ferrugineo-tomentella. *Sepala* 5, triangularia, carinata, extus albido-tomentella. *Petala* 5, spathulata, cucullata. *Discus* quinquangularis, sub stylo glandulosus. *Receptaculum* (ovarium) obconicum, albido-tomentellum, 2–3-loculare, loculis uniovulatis; stylus conicus, apice trilobatus (raro bilobatus). *Fructus* non visus.

QUEENSLAND. Near Barron River, *Bailey* (24)*; Innisfail, *Ladbrook* 26, *Michael* 400; Jordan Creek, *Mocatta* 23*.

Vernacular name: "Maraticoola."

Specimens of this tree were received from Mr. C. T. White who remarked that it is the tree referred to by Bailey† as *A. excelsa* var. *franguloides*, but with this I do not agree. It is quite distinct from *A. franguloides* Gray, which is a plant characterised by its small leaves. The specimens examined all came from the vicinity of Innisfail. The leaves are very robust, prominently veined and quite distinctive.

6. **A. franguloides** *A. Gray* in Bot. U.S. Expl. Exped. 1. 280 (1854) and t. 22 (1857).

FIG. *Wilkes*.

I have little doubt but that the specimen collected by Wilkes of the U.S. Exped. and marked by A. Gray "*A. zizyphoides* diversa" is a genuine specimen of *A. franguloides* Gray as understood by Gray. It agrees well with his description

† Bailey; Cat. Queensl. Pl. p. 837.

and figure. One cannot help wondering, however, if it is not merely a depauperate form of *A. zizyphoides* A. Gray. The general shape of the leaf is somewhat similar; it differs mostly in the cuneate base and less acuminate apex, and is of finer texture and considerably smaller.

7. *Alphitonia obtusifolia* Braid sp. nov.

Arbor. *Folia* alterna, elliptica vel ovato-lanceolata, apice obtusa vel interdum emarginata saepe brevissime cuspidata, 6–14 cm. longa, 3–7 cm. lata, nervis leviter costa media praecipue in pagina superiore impressis, in pagina inferiore costa media conspicua nervis lateralibus utrinsecus circiter 7–12, fere planis; juniora omnino ferrugineo-tomentella, deinde saepe supra glabra, nonnunquam lucido-viridia, infra albedo-tomentella, costa nervisque fulvis deinde ferrugineis, deinde raro glabrescentibus; petiolus circiter 1–3 cm. longus, tomentellus. *Inflorescentiae* terminales vel plerumque in foliorum superiorum axillis orientes, cymosae superne saepe confertae; pedunculi sulcati, 2 cm. longi, ferrugineo-tomentelli; rhachis dichotome ramosa, ferrugineo-tomentella. *Sepala* 5, triangularia, carinata, extus albedo-tomentella. *Petala* 5, spathulata, cucullata. *Discus* quinquangularis, glandulosus, sub stylo pilosus. *Receptaculum* (ovarium) obconicum, albedo-tomentellum, 2–3-loculare, loculis uniovulatis; stylus conicus, apice trilobatus (raro bilobatus). *Fructus* non visus.

AUSTRALIA. Queensland and Region of Gulf of Carpentaria. Carpentaria, *Brown* 5364,* Chillagoe, *Michael* 303; Endeavour River, *Peisiech* 34; Massacre Inlet, *Brass* 47; Sweer's Island, *Henne*; Walsh River, *Millar* 33.

The leaves are of a distinctive shape and, usually in the dry state after the rusty tomentum has worn off, they exhibit a distinctly yellowish felt-like covering on the lower surface. The upper surfaces of the older leaves are frequently of a slaty green colour. The petioles are usually longer than in *A. Whitei* and markedly longer than in *A. excelsa* and *A. moluccana*.

Robert Brown collected this plant when exploring Bentick, Sweers and Allen Islands in the Gulf of Carpentaria. He named it *Caenothoides obtusifolia*—a name which appears on herbaria sheets in the British Museum and at Kew—and wrote a description for it as No. 14 in his diary for the 20th November, 1802, but this was never published. The specimen and diary are in the British Museum, and a duplicate specimen is also in the Kew Herbarium. On his voyage up the east coast of Australia, R. Brown also collected *A. excelsa* Reissek which he labelled *Caenothoides* sp. Probably he recognised that he had a distinct species of the same genus in Carpentaria. The exact distribution of this species cannot yet be given with certainty. It appears to be the only species of *Alphitonia* on Sweer's and Allen's Islands. It is common around the Gulf of Carpentaria and apparently stretches as far south as the vicinity of Keppel Bay. Between it and *A. excelsa*, certain intermediate types

of leaves are as difficult to determine as the Sweer's Island type of leaf is easy.

A. obtusifolia *Braid* var. **tenuis** *Braid* var. nov.; foliis tenuibus in siccitate semper nigris vel atro-viridibus nunquam salviae colore.

N. AUSTRALIA. "North Coast," *R. Brown**; Groote Eylandt, *Tindall* 44.

At first sight this plant looks quite distinct from the typical *A. obtusifolia*. The leaves are distinctly thinner and the underside is often markedly white instead of a creamy green. The veins on the underside run out towards the margins and then turn upwards more clearly and link on to those above. The thick-leaved form shows similar venation only the veins are apt to merge into the thickened edge and the effect is masked as a rule by the greater curling of the margins. That *R. Brown* recognised the affinity of this plant is shown by the fact that he labelled his specimen *Caenothoides obtusifolia*. As I have not seen any intermediate between this and the thicker leaved form I have made this a variety, but I do so with some hesitation.

8. **A. zizyphoides** *A. Gray* in U.S. Expl. Exped. 1. 278 (1854) and t. 20 (1857); *Rhamnus zizyphoides* *Spr.* Fl. hal. Mant. 37 (1807), *Syst.* 1. 768 (1825).

POLYNESIA. Fiji; *Horne* 481 and 655, *Milne* 45 and 86, *Seemann* 81; Tongatabu, *Wilkes*. Samoa; *Reineche* 279, *Vaupel*, *Whitmee* 42. Tahiti, *Barclay*, *Forster* (?). Cook Islands; Raratonga, *Cheeseman* 529, *Wyatt-Gill*. 85.

Vernacular Names: "Doi," "Toé," "Toi."

From the specimens in the Kew Herbarium it appears that there may be a number of distinct local forms. Those from Cook Islands possess the most ovate shape and have hard, rigid leaves which are well preserved. The Samoan specimens tend to be more lanceolate and are least broadly rounded at the base. Many intermediate forms come from Fiji.

9. **Alphitonia philippinensis** *Braid* sp. nov.

Arbor. Folia alterna, elliptica vel ovato-lanceolata, apice acuminata vel acuta brevissime cuspidata 6–13 cm. longa, 2–4 cm. lata, nervis leviter costa media praecipue in pagina superiore impressis, in pagina inferiore costa media conspicua nervis lateralibus utrinsecus circiter 8–12 fere planis; juniora omnino ferrugineo-tomentella, supra mox glabra vel subglabra, infra albido-tomentella, costa nervisque fulvis deinde atroferrugineis, deinde glabrescentibus; petiolus circiter 1–1.5 cm. longus, tomentellus. *Inflorescentiae* terminales vel in foliorum superiorum axillis orientes, cymosae superne saepe confertae; pedunculi sulcati, primo ferrugineo-tomentelli tandem glabrescentes; rhachis dichotome ramosa, primo ferrugineo-tomentella tandem glabrescens. *Sepala* 5, triangularia, carinata, extus albido-tomentella. *Petala* 5, spathulata, cucullata. *Discus*

quinquangularis, sub stylo glandulosus, pilosus. *Receptaculum* (ovarium) obconicum, albido-tomentellum, 2-3-loculare, loculis uniovulatis; stylus conicus, apice trilobatus (raro bilobatus). *Fructus* erectus deinde pendulus, receptaculo 0.6 cm. alto inclusus, ovoideo-globosus vel obovato-globosus, omnino 1.3 cm. altus, usque ad 1-4 cm. diametro; epicarpium siccitate farinaceum; endocarpium coccis coriaceis duris 2-3, per receptaculum longitudinaliter dehiscens. *Seminis arillus* durus, lucidus, atrosanguineus.

MALAY ARCHIPELAGO. Philippines: Baco, *Merrill* 1222; Dumaquate, *Elmer* 9432* and 10335*; Island of Guimaras, *Vidal*; Island of Paragua, *Merrill* 854; Luzon, *Vidal* 1351, *Cunning* 1048; Todaya, *Elmer* 10854. Borneo; Baram, *Hose* 481; Bangarmassing, *Motley* 193.

The markedly attenuated apex to the leaf in the typical *A. philippinensis* at once distinguishes it from all others with the exception of *A. ponderosa*. The specimens from Borneo and neighbourhood are broader than the average and suggest *A. moluccana*; the leaf bases, however, are not cordate and the apex is long and attenuated. Those from the Philippines are more like the true *A. zizyphoides* in the lower portion, but much more attenuated towards the apex. The under surface of the leaf sheds the tomentum more rapidly than *A. moluccana* and the veins are slightly darker and hence more distinct. The mature leaf is beautifully soft on the lower surface owing to its fine, close, white tomentum.

The Philippine specimens have been identified as *A. zizyphoides*, *A. excelsa* and *A. moluccana* and certain individual specimens do resemble examples of these. As already pointed out the typical *A. philippinensis* is, however, quite distinct from these, especially from the first two, but some poorly shaped or malformed leaves are sometimes very difficult to place.

10. *A. ponderosa* Hilleb. Fl. Haw. Isl. 81 (1888); Sinclair Fl. Hawaii t. 25 (1885).

HAWAIIAN ISLANDS. Island of Kauai, *Heller*. "Sandwich Islands", *Hillebrand* 129.

Vernacular Name: "Kauwila."

Tall tree 50-80 feet. *Hillebrand* makes a point of distinction in the position of the circumsessile line in the drupe. Specimens of fruits were not able to be obtained for this to be verified. The leaves appear to be intermediate between *A. zizyphoides* and *A. philippinensis*.

11. *Alphitonia moluccana* *Teijsm. et Binn.* Cat. Hort. Bogor 221, nomen.

Arbor. *Folia* alterna, ovata vel ovato-lanceolata, apice acuta interdum brevissime acuminata, basi plus minusve cordata, 12-30 cm. longa, 6-10 cm. lata, nervis leviter costa media conspicua in pagina superiore impressis in pagina inferiore costa media conspicua nervis lateralibus utrinsecus circiter 12-19

conspicuis; juniora omnino ferrugineo-tomentella, supra fulva mox fere glabra, infra dense albido-tomentella, costa nervisque fulvis deinde ferrugineis, deinde raro glabris; petiolus circiter 1 cm. longus, ferrugineus, tomentellus. *Inflorescentiae* cymosae in ramulis lateralibus foliatis terminales et axillares. *Pedunculus* sulcatus, 2-3 cm. longus, ferrugineo-tomentosus raro glaber; rhachis superne saepe conferta, dichotome ramosa, ferrugineo-tomentosa raro glabra. *Sepala* 5, triangularia, carinata, extus albido-tomentella. *Petala* 5, spathulata, cucullata. *Discus* glandulosus, quinquangularis. *Receptaculum* (ovarium) obconicum, albido-tomentellum, 2-3-loculare, loculis uniovulatis; stylus conicus, apice trilobatus. *Fructus* erectus, deinde saepe pendulus, receptaculo 0.5-0.7 cm. alto inclusus, ovoideo-globosus vel obovato-globosus, omnino 0.5-0.7 cm. altus, usque ad 1.0-1.3 cm. diametro; epicarpium siccitate farinaceum; endocarpium coccis coriaceis duris 2-3, per receptaculum longitudinaliter dehiscens. *Seminis* arillis durus, lucidus, atrosanguineus.

AUSTRALIA. N. Queensland; Cairns, *White* 35.

MALAY ARCHIPELAGO. Amboina, *Robinson* 1773; Aru, *Beccari*. Borneo; Gaya, *Creagh*; Kuching, *Haviland* 923. Celebes, *Hose*, *Beccari*. Moluccas; *Beccari*, *Teijsmann**. New Guinea; Beena District, *Lane Poole* 45; Biscatabu, *White*; Boku, *Schleucker* 38; Finschafen, *Hollrung*; Mafula, *White* 469; Sogeri Region, *Forbes* 332; Ternetea (*Beccari*?) 5205: Timorlout, *Meyer*.

Vernacular Name: "Rourita."

The leaves are usually very robust and often are markedly cordate at the base. The young shoots, pedicels and young leaves are clothed with reddish hairs, especially along the nerves and veins on the under-side of the leaves. This, however, soon disappears and the under-surface of the leaf is left covered with a soft and white tomentum. Like the leaves the fruits vary much in size. The bark when stripped off the tree smells strongly of sarsaparilla as is the case with *A. excelsa*.

A. moluccana has most frequently been confused with *A. excelsa* and *A. philippinensis*, but ordinarily it has a much ranker type of leaf. The magnificent ovate-lanceolate leaves from New Guinea, and the better developed ovate-ovate-cordate ones from the Moluccas instantly distinguish it from all other species; the less robust forms are frequently very difficult to identify.

12. *A. erubescens* *Baill.* *Adansonia* xi. (1873-76), 271; *Schlechter* in *Engl. Jahrb.* xxxix. (1906) 179. t. 15.

NEW CALEDONIA. Ngoye, *Schlechter*.

Quite a distinctive shrub resembling only *A. xerocarpa* from which it is clearly distinguished by its smaller, almost epetiolate leaves, which are reddish on the under-surface. It grows as a small shrub (seldom exceeding 1 m. in height) on the higher, drier declivities (900 m.) in the southern regions

of New Caledonia.* It flowers sparingly about November-February, but no good description of fruits exists.

13. *A. xerocarpa* Baill. *Adansonia* xi. (1873-76), 270; Schlechter in *Engl. Jahrb.* xxxix. 1906 p. 179, t. 14; *A. lucida* Vieill. mss. ex Guillaumin in *Ann. Mus. Col. Marseille*, 1911. Sér. 2, ix, 121.

NEW CALEDONIA. Messiaencoué, *Balansa*; Ngoye, *Schlechter*; Paita, *Schlechter*; Canala, *Vieillard* 29.

There are some splendid specimens in the British Museum collected by R. H. Compton. On the valuable notes accompanying them, he states that the tree can grow to 25 feet in the vicinity of creeks, and is found, on serpentine, in "shrub" or shrubby-woods, up to 1000 m. He observes that the midrib is reddish and the flowers white and sweet-scented. Schlechter describes the plant from the high, dry, declivities of the southern coast where he found it up to 1250 m. He says that it flowers about October and November and remarks that the fruits are quite different from those of *A. excelsa*. The latter, however, have not been described satisfactorily and I have not been able to obtain material for examination.

Through the kindness of Professor Lecomte I have been able to examine *Vieillard* 29. It is typical of *A. xerocarpa* Baill. though the flowers are smaller and the secondary nerves of the leaves more distinct.

XXII.—ADDITIONS TO THE INDEX KEWENSIS: IV.*

During the preparation for the press of the sixth Supplement of the Index Kewensis it was discovered that certain names published in Crantz's *Classis Cruciformium* (1769) had been overlooked by most authors and had not been included in the Index Kewensis. As Crantz failed to give any indication as to which of the names adopted in his *Classis* were new, citing neither authors' names nor places of publication, it was necessary to check each of the 214 names with the Index Kewensis, with the result that, by a process of elimination, fifty names proposed by Crantz and not hitherto included in the Index were discovered. These are given below, followed by the pages of the *Classis Cruciformium* and the Linnean names on which they are respectively based. As the Linnean equivalents were not cited by Crantz, they have had to be determined by means of the pre-Linnean synonyms given by both authors.

Nasturtium alexandrinum Crantz was based on the pre-Linnean *Thlaspi alexandrinum*, which was cited by Linné†

* Continued from *Kew Bull.* 1924, p. 283. † *Sp. Pl.* ed. 2, 898 (1763).

under *Lepidium perfoliatum*, apparently in error. No one appears to have identified it. Crantz was uncertain as to whether his *Rapistrum Halleri* was conspecific with *Sisymbrium Barrelieri* or not. The synonymy of the forty-eight remaining names is clear.

Fortunately no alteration in established nomenclature is entailed, apart from a few changes in the authorities for names. The genus *Rapistrum* dates from Crantz, Class. Crucif. 62, 105 (1769), not from Medicus (1789), as cited in the Index Kewensis. *Rapistrum orientale* and *R. hispanicum* should be ascribed to Crantz (1769), instead of DC. (1821) and Boiss. et Reut. (1842, in synonymy) respectively. *Cardamine bulbifera*, *C. enneaphyllos* and *C. pentaphyllos* should similarly be attributed to Crantz, not to Ait. f. (1812).

Draba hirsuta Crantz is a *nomen abortivum*, having been substituted for *D. austriaca* Crantz in contravention of the International Rules, Art. 50.

Rapistrum pygmaeum and *Nasturtium palustre* are *nomina abortiva* because they contravene Art. 48.

In the Index Kewensis *Erysimum orientale* Mill. is erroneously reduced to *Conringia orientalis* Andrz., whereas it is a synonym of *Barbarea plantaginea* DC. (*Sisymbrium Barbareae* L.), as is evident from the Tournefortian reference. Two mistakes in O. E. Schulz's nomenclature may also be indicated. He adopts* *Erucaria myagroides* (L.) Halácsy, in place of *E. hispanica* (L.) Druce, but the latter has precedence under International Rules (Art. 48). He attributes† the combination *Eruca sativa* to Garsault, but, as has been demonstrated by Rendle and Britten,‡ Garsault's work is pre-Linnean in character, and his names have no claim to recognition. The combination should be ascribed to Mill. Gard. Dict. ed. 8 (1768). Hill, who adopted it previously in his British Herbal (1756), had not at that date accepted the binominal system of Linné, the names of species in his Herbal being partly plurinominal, partly binominal and a few uninominal. It is now generally agreed§ that "accidental" binominals such as those of Garsault and Hill should be treated as invalid.

T. A. S.

CRANTZ, CLASSIS CRUCIFORMIUM (1769).¶

Cardamine

- bulbifera 127 : *Dentaria bulbifera*.
- enneaphyllos 127 : *Dentaria enneaphyllos*.
- pentaphyllos 127 : *Dentaria pentaphyllos*.

Clypeola

- alliacea 91 : *Peltaria alliacea*.

* Engl. Pflanzenr. Crucif.-Brassic. ii. 9. † l.c. i. 181. ‡ Journ. Bot., 1909, 322. § Vide Journ. Bot., 1921, 156, 289; et l.c., 1922, 117.

¶ Names already included in the Index Kewensis have been omitted.

Cochlearia

- hispanica 97 : *Crambe hispanica*.
- maritima 96 : *Crambe maritima*.
- orientalis 97 : *Crambe orientalis*.
- rugosa 100 : *Myagrum rugosum*.
- sphaerocarpa 97 : *Myagrum sphaerocarpum*.

Draba

- hirsuta 95 : *Draba austriaca*.

Erysimum

- hirsutum 64 : *Turritis hirsuta*.
- hirtum 117 : *Turritis hirsuta*.
- orientale 116 : *Brassica orientalis*.

Isatis

- Lunaria 104 : *Cardamine Lunaria*.

Myagrum

- cornutum 102 : *Bunias cornuta*.
- Coronopus 101 : *Cochlearia Coronopus*.
- Erucago 103 : *Bunias Erucago*.
- hierochunticum 101 : *Anastatica hierochuntica*.
- syriacum 101 : *Anastatica syriaca*.

Nasturtium

- alexandrinum 79 : *Thlaspi alexandrinum* *J. Bauh. Hist. ii. 933* (which is cited by Linné, *Sp. Pl. ed. 2, 898*, as a synonym of *Lepidium perfoliatum*.)
- chalepense 79 : *Lepidium chalepense*.
- Draba 81 : *Lepidium Draba*.
- Iberis 82 : *Lepidium Iberis*.
- latifolium 79 : *Lepidium latifolium*.
- palustre 81 : *Subularia aquatica*.

Raphanus

- albus 109 : *Sinapis alba*.
- arvensis 109 : *Sinapis arvensis*.
- Brassica 63 : *Brassica oleracea*.
- Brassica-officinalis 112 : *Brassica oleracea*.
- campestris 113 : *Brassica campestris*.
- chinensis 112 : *Brassica chinensis*.
- Eruca 111 : *Brassica Eruca*.
- Erucastrum 111 : *Brassica Erucastrum*.
- erucoides 110 : *Sinapis erucoides*.
- hispanicus 110 : *Sinapis hispanica*.
- incanus 110 : *Sinapis incana*.
- junceus 110 : *Sinapis juncea*.
- laevigatus 110 : *Sinapis laevigata*.
- Napus 113 : *Brassica Napus*.
- orientalis 109 : *Sinapis orientalis*.
- pyrenaicus 109 : *Sinapis pyrenaica*.
- Rapa 113 : *Brassica Rapa*.
- Sinapis-officinalis* 109 : *Sinapis nigra*.
- vesicarius 111 : *Brassica vesicaria*.
- violaceus 112 : *Brassica violacea*.

Rapistrum 62, 105.

- aegyptium 106 : *Myagrum aegyptium*.
- Cakile 106 : *Bunias Cakile*.
- Halleri 107 : *Sisymbrium Barrelieri*.
- hispanicum 106 : *Myagrum hispanicum*.
- orientale 106 : *Myagrum orientale*.
- pygmaeum 107 : *Raphanus sibiricus*.
- pyraenaicum 62 (a misprint for "*pygmaeum*."

Thlaspi

- Camelina 78 : *Myagrum sativum*.

XXIII.—MISCELLANEOUS NOTES.

MR. B. C. ASTON, Hon. Secretary of the New Zealand Institute, and chief chemist in the Department of Agriculture, New Zealand, has been awarded the Hector Prize for his researches on the chemistry of bush sickness and on the New Zealand flora.

MISS L. S. GIBBS.—We much regret to record the death of Miss Lillian Suzette Gibbs, which occurred at Santa Cruz, Teneriffe, on January 30th. Miss Gibbs, who was an enthusiastic botanist and an indefatigable collector and traveller, had the advantage of a botanical training not only at Swanley College but at the Royal College of Science under Prof. J. B. Farmer where, after taking the ordinary botanical courses, she engaged in research and was awarded the Huxley Medal and Prize.

Her early collections were made in the Alps of Europe and in North Africa, but she subsequently travelled extensively in many other regions of the world, being particularly interested in comparing floras of high mountain ranges. In 1905 she accompanied the British Association to South Africa and joining various expeditions proceeded as far as the Victoria Falls. She visited Fiji in 1907 and was the first to collect in the Mount Victoria Range, where she obtained many new species. On her way home she visited New Zealand. In 1910 she travelled in North Borneo and ascended the summit of Kinabalu (13,000 ft.), being the first woman to perform this feat, and made a valuable collection of plants. In 1912 she visited Iceland. In 1913, following in Beccari's footsteps, she explored the Arfak Mountains in Dutch New Guinea, and published an account of her travels in a work entitled 'The Phytogeography and Flora of the Arfak Mountains.' From Dutch New Guinea she proceeded to Australia and visited the very interesting Bellenden Ker Range in Queensland, investigating particularly the tropical zone of rain forest. From here she proceeded to Tasmania, collecting on the mountain plateaux. She also visited South America.

Miss Gibbs paid frequent visits to Kew in the course of working out her collections and presented the establishment with many sets of specimens. The published accounts of her expeditions appeared in various botanical journals, and were each noteworthy for containing not merely lists of species but an account of the vegetation and discussions on plant-geography.

A. D. C.

Saxifraga odontophylla and S. asarifolia.—The binary combination *Saxifraga odontophylla* Wall. appeared without description in Wall. Cat. no. 454 (1828) with the two localities "Bhuddrenath, Kamroop", the former being in Garhwal, the latter in Assam.

The names of new species appearing in Wallich's Catalogue were formerly regarded as having been effectively published in that work, although unaccompanied by descriptions, on account of the distribution of Wallich's dried specimens amongst the principal herbaria of the world. Under the International Rules of Nomenclature, Art. 37, however, "the mention of a name on a ticket issued with a dried plant without printed or autographed diagnosis" is not effective publication. In 1831 Sternberg* recognised that two species were represented under Wallich's number 454: one with small incised-crenate or incised-dentate leaves, numerous flowers, oblong calyx lobes and triplinerved petals; the other with large broadly crenate leaves, few flowers, ovate calyx lobes and multinerved petals. He described the former under the name *S. odontophylla* Wall. and the latter as *S. asarifolia* Sternb. *S. odontophylla* Wall. ex Sternb. was collected in Kamroop by Wallich, and *S. asarifolia* Sternb. in Bhuddrenath by Blinkworth. The name *S. odontophylla* must therefore be applied—whether as an accepted name or as a synonym—to the small-leaved plant collected by Wallich in Kamroop.

In 1858 J. D. Hooker and T. Thomson reduced *S. odontophylla* Wall. ex Sternb. to *S. sibirica* Linn. and re-applied the name *S. odontophylla* Wall. to *S. asarifolia* Sternb.† This nomenclature was accepted twenty years later by C. B. Clarke.‡ Regarding as they did *S. odontophylla* Wall. as effectively published in Wallich's Catalogue, Hooker and Thomson, and C. B. Clarke were perhaps justified in retaining the name *S. odontophylla* for the residue of Wallich's species after the transference of the Kamroop plant to *S. sibirica*. As pointed out above, however, there is now no justification for this application of the name *S. odontophylla*, and it is somewhat surprising that it should have been accepted in 1916 by Engler and Irmscher.§

The name *S. asarifolia* Sternb. should now be accepted. The following is the principal synonymy:—

***S. asarifolia* Sternb.** Rev. Saxifr. Suppl. 2, 33 (1831).—*S. odontophylla* Wall. Cat. n. 454 (1828), nomen, partim; Hook. f. and Thoms. in Journ. Linn. Soc., Bot. ii. 64 (1858); C. B. Clarke in Hook. f. Fl. Brit. Ind. ii. 390 (1878); Duthie in Strachey, Cat. Pl. Kumaon, 60 (1906); Engl. and Irmsch. in Engl. Pflanzenr. Saxifragac.-Saxifraga, 18 (1916); non Wall. ex Sternb. 1831.

M. L. G.

Gold Coast Plant Diseases.¶—With increasing realisation among planters of the losses caused by fungus diseases and the

* Rev. Saxifr. Suppl. 2, 33 (1831).

† Journ. Linn. Soc., Bot. ii. 64 (1858).

‡ Hook. f. Fl. Brit. Ind. ii. 390 (1878).

§ Engl. Pflanzenr. Saxifraga, 18 (1916).

¶ Gold Coast Plant Diseases, by R. H. Bunting and H. A. Dade. The Crown Agents for the Colonies, 4, Millbank, Westminster, S.W. 1. Price 6s.

importance of combating them, the preparation of local fungus floras and summaries of existing knowledge as to the local diseases becomes more and more desirable. Mr. Nowell's recent book on the "Diseases of Crop Plants in the Lesser Antilles" is now followed by a useful manual on "Gold Coast Plant Diseases," by Mr. Bunting and Mr. Dade, Mycologists to the Department of Agriculture, Gold Coast Colony.

This work, which is intended for the instruction of planters knowing little of mycology as well as for the use of more informed technical officers, is prefaced by a simple, clear account of diseases in general and their causes, with information as to the methods of dissemination of fungi and general principles of control. Short descriptive accounts of the fungus diseases occurring on crops grown in the Gold Coast Colony and its dependencies are given and are accompanied by illustrations, which in some cases are coloured. In each case the symptoms of disease are described, some account is given of the causative fungus and conditions predisposing to attack by it, and finally methods of control are discussed. The diseases of Cacao in a work on the Gold Coast naturally command chief attention, but Coffee, Para Rubber, Palms, and other long rotation crops are dealt with, and also the common diseases of annual economic plants. Extracts from recent Gold Coast legislation against plant diseases are given, and a list of all fungi which have been recorded from this region up to the present is included. A short glossary explaining the technical terms used will be found of assistance to readers who are not acquainted with mycological terminology.

The copious illustrations, some from photographs and some from coloured drawings, add greatly to the value of the work, which will be indispensable to all those dealing with agricultural problems in the Gold Coast. The solution used in binding the book has been specially prepared in order to render the work impervious to the ravages of insects.

E. M. W.

British Weeds, their identification and control.*—This book is aptly described as "a practical illustrated handbook for the use of estate owners, farmers, gardeners and students of agriculture, horticulture and field botany." With this object in view the keys and descriptions have been carefully prepared for the use of the general public who may not have an intimate knowledge of botany. The descriptions of the plants are arranged alphabetically under their common English names and are accompanied with notes on control measures and other points of interest. The arrangement is in four sections dealing with weeds of arable land; weeds of meadows and pasture; weeds of lawns, golf greens, garden paths, etc.; weeds of ponds, lakes and water

* By Richard Morse and Ray Palmer. Ernest Benn Ltd., London, 1925. 8vo. pp. 206, ill. 32, plates 8. Price 10s. 6d.

courses. Scientific names, local names, and names generally in use are each given in a separate index. There are several Appendices, and of particular interest and importance are those dealing with poisonous weeds; plants which act as hosts for insect pests and fungus diseases; and the enumeration of injurious weeds. The scheme of the book has been carefully considered, and there are many original photographs and drawings. K. W. B.

The Principles of Vegetable-Gardening.*—The eighteenth edition of this book opens with an inventory of vegetables classed under three headings, those valued for their leaves or herbaceous parts, root vegetables of which certain underground parts are eaten, and fruit vegetables of which the fruits or seeds are required. There are 247 different kinds enumerated of which 114 are leaf vegetables, 59 root vegetables and 74 fruit vegetables.

The book, which consists of twenty chapters, deals in detail with the various classes of vegetables, such as perennial, salad, bulbs and potato crops, and solanaceous and cucurbitaceous fruits, the last named including musk-melons, pumpkins and squashes, which are so largely grown in the United States. A chapter is devoted to Sweet Corn (*Zea Mays*), Okra or Gumbo (*Hibiscus esculentus*), and Martynia (*Proboscidea louisiana*), plants which do not assume any importance in this country. Botanical descriptions of each plant are included, and in most cases are accompanied by illustrations of the seeds, seedlings, and the mature plant. Cultural details are given for each subject, together with the particular insect pests and fungus diseases, and there are also chapters on crops under glass and on the land and its treatment, the latter dealing with rotations, draining, irrigation and manuring. Other subjects discussed are tools and implements, seeds and seed growing, the general management of the vegetable garden, marketing, storing, and drying, and finally there is a chapter on the home garden.

Although some of the crops and cultural methods dealt with are only applicable to conditions obtaining in the United States, the book includes so much useful and interesting information that it merits the attention of anyone interested in the cultivation of vegetables.

J. C.

* By L. H. Bailey, Macmillan Coy., New York, 1921, pp. 490, text fig. 252. Price 20s.